# Build Manual

mini

DROIDWORX LTD NEW ZEALAND

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# Flight operation and safety

# Operation and Safety

This is a quick guide for those new to Multi-Rotor craft offering some basic safety and operational procedures...and are recommended standard operating procedures for those piloting Droidworx or any multi-rotor craft.

Please read the instructions for the relevant Flight Control electronics before proceeding. Go to the web site of your flight control system and make yourself well acquainted with the correct procedure for the electronics installation and software operation.

Caution: never connect and start the engines for the first time with the propellers attached....and always balance your propellers; unbalanced propellers can cause excessive vibration which may lead to material fatigue.

Note: check the orientation of the flight controller you are using (which way is front) and also the engine assignment configuration; for instance which is engine 1,2,3 etc. and check also that your propellers, clockwise and counter clockwise, are also installed correctly before your first flight.

Before the first flight hand test your craft – arm and calibrate your electronics, hold the craft with both hands by the landing gear skids above your head with the front facing away from, and to the front of you, make sure you are well clear of obstructions and other people.  You may need the assistance of another person for this test. Raise the throttle to around 25% and gently move the craft around the axis' roll (tipping the craft left and right) and feel for a steady and smooth resistance to your movements, do the same for pitch (tipping the craft  forward and backward) and also yaw, rotating the craft clockwise and anti-clockwise whilst keeping it horizontal. If the craft offers smooth resistance to your movements it will fly correctly.

Your first test flight should be in an open field in low or zero wind. A sports field (not currently in use) is a good option; choose a site with short or mown grass. Do not takeoff from dry dusty sites. Make sure any onlookers or spectators do not gather about you…if so ask them to move away from you in a perimeter not less than 50m (150 feet) diameter around you.

Make sure that you have fully charged your transmitter and onboard battery packs. Make sure that the antenna of your Radio (TX) is up and correctly positioned; make sure the receiver (RX) for your craft is well positioned within the craft and secured and that the antenna is facing downward and to the back of your craft and not touching any part of the craft.

Place the craft on level ground and turn on your transmitter – check that you have the correct model selected on your TX.
Set the transmitter timer to about 80% of the known flight duration.
Connect the battery to your crafts FC inputs and wait for the engine controller beeps to stop.
Stand about 4m away from your craft and behind the craft with the craft facing directly away from you.
Check the 50m flight safety perimeter you have established, also checking behind you for children running in to see what you are doing.
Survey the area; look for obstacles that you might not have seen previously, like power-lines and overhead wires.
Never fly your craft near a controlled aerodrome or in controlled airspace.
Check the weather conditions, the wind speed and direction. Do not fly in gusty strong wind at any time. Always try and fly the craft with the wind at your back so the craft will drift directly away from you.
Always keep your eyes on the craft when in flight – if people approach you inside your safety perimeter to talk to you or to ask questions whilst you are flying the craft do not engage in the conversation and ask them to stand well clear of you until you have landed.
Re-check your perimeter and raise the throttle slowly and check to see if the craft wants to tilt to one direction or another; sometimes you may need to adjust the trim on your TX to get a level flight, however most times the craft will fly perfectly first time if you have installed the electronics and the software has been set correctly—check with the Flight Control manufacturer for standard or beginner settings for the craft.
Takeoffs are sometimes easier with a short burst of power to lift the craft off the ground.
Hold the craft in a controlled hover directly in front of you about 2-3m off the ground away from “ground effect” prop wash. When you have mastered this hover position you can then move on to rolling the craft gently from side to side and forward and backward.  Make sure that you always stand behind the craft, this makes for easy orientation of the flight controls.
Repeat this exercise several times before you take the craft any higher.
Always fly the craft well away from people and / or property. Always check for children nearby.

# Pre-Flight Safety Check

**Thoroughly check the craft before every flight…**

- Pre-Flight Safety Checke safe and secure and not loose.
- Check to see if any wires have come off
- Check for loose bolts on the assembly
- Check that the battery's are secure
- Check the battery voltage, and if you have more than one battery, check your spares too
- Check the propellers for marks and nicks
- Check the propeller nuts or bolts, make sure they are tight
- Check the engine mounts and the bolts and nuts for tightness
- Check the Transmitter battery voltage; never fly the craft with a low voltage reading on your transmitter (check with the manufacturer of your equipment for minimum and maximum voltage readings).
- Check that the transmitter antenna is not damaged.
- Check that the craft receiver module is well connected and that the antenna's are properly positioned.
- Take a good look over the craft from all sides to make sure that nothing appears unusual or out of place.
- Check your flight perimeter.
- Check for power-lines and overhead obstacles.
- Assess the weather conditions, wind direction and speed. An anemometer (hand held wind speed meter) is a good tool to have, otherwise use some dry grass or a tissue, throwing in the air to gauge the wind direction. Do not fly in gusty and turbulent conditions.
- Set your transmitter timer to 80% of the known battery duration.

DISCLAIMER:
Droidworx NZ Limited disclaims all warranties, whether expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Droidworx NZ Limited does not assume any lyability, whether direct or indirect, from the use of the Mini 4 or 6. Droidworx NZ Limited shall not be liable for any direct, indirect, special, incidental, punitive, contingent or consequential damages to persons or property caused by the Mini craft. In no event shall Droidworx NZ Limited be liable for personal injury up to and including death.

# Do's and Dont's:

- Never fly in strong wind – the operational safe wind speed for these craft is about 10-15 KPH.
- In the event of a crash or a hard landing, always check the craft for damage before taking off again. In this instance, you must also check that you do not have dirt or grit in the engines; this can cause an engine or engines to overheat and fail in flight resulting in an out of control craft and serious damage or injury to the craft , other people and their property.
- Your launch field should preferably be open and flat with short grass. If it is necessary to take off in a field which only has long grass, manually flatten a 1.5m diameter take off perimeter with your feet.
- Always have a flight plan – visualize your flight path and check again for obstacles.
- Never fly the craft out of direct line of sight and always keep your eyes on the craft whilst it is in the air.
- Never fly the craft above 400 feet in height (the length of a football field).
- Never fly near people – a 50m (150 ft) perimeter around and above people is a recommended minimum and operational law in most countries.
- Always set your transmitter timer before each flight to about 80% of the known flight duration for the battery pack's you have installed in the craft.
- Never turn your transmitter off in flight.
- First person view flights are against the law in some countries – check the relevant aviation safety authority in your country before flying FPV. Always have a "spotter" with if you do fly FPV.
- Never let friends fly your craft unless they are well schooled in the discipline.
- Never fly under the influence of any substance or alcohol. Whilst there is a minimum blood alcohol level allowed for driving an automobile in most countries, the law for pilots in command of flying craft around the globe is universal…there is a zero limit tolerance.
- Always turn your transmitter on before connecting the battery to the craft...and always disconnect the battery from the craft before turning your transmitter off.

# Pre-build Checklist

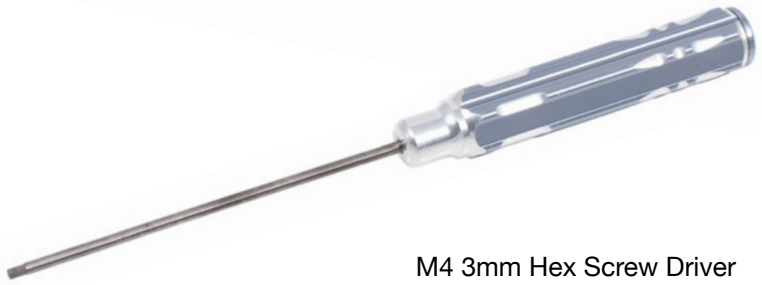
# Required Tools

3mm Phillips Head Driver

M4 Hex Driver

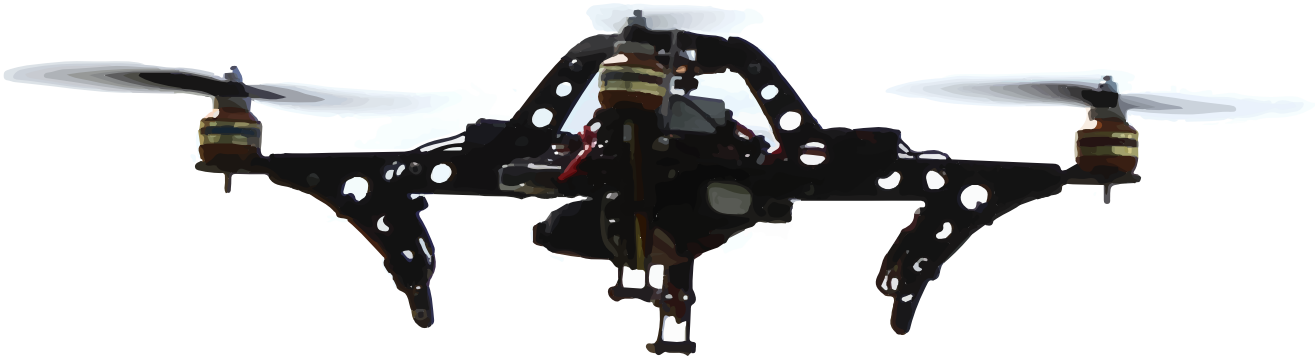
M3 2.5mm Hex Screw Driver

M3 Hex Driver



M4 3mm Hex Screw Driver

# Assembly Instructions



# PART 1: LG / BODY PLATE ASSEMBLY MINI 4 – PARTS LIST

| Product Code | | Parts + Spares | | |
|---|---|---|---|---|
| **1101-0010** | Top Hub | 2 | | |
| **1201-0010** | Center Plate | 1 | | |
| **1201-0030** | Universal Flight Controller Adapter Plate | 1 | | |
| **1201-0040** | Engine Mount Plate | 4 | | |
| **1401-0020** | Landing Gear / Body Plate | 8 | | |
| **1406-0050** | Velcro Strap | 1 | | |
| **2503-0070** | Standoff Threaded M3x11mm Nylon | 4 | | |
| **2506-0030** | Socket Head Cap Screw M3x20mm | 22 | (1) | |

| Product Code | | Parts + Spares | | |
|---|---|---|---|---|
| **2506-0140** | Machine Screw M3x6mm Pan Philips | 9 | (1) | |
| **2506-0170** | Nyloc Nut M3 SS | 23 | (2) | |
| **2506-0190** | Nylon Washer M3 | 42 | (2) | |
| **2506-0210** | Nylon Spacer M3x10mm | 13 | (1) | |

## 1

Slide a washer over the M3x20 socket head cap screw and slide into the corresponding holes of the landing gear / body plate as shown in the picture below.

X3

X3

## 2

Slide the nylon spacers over the screws.

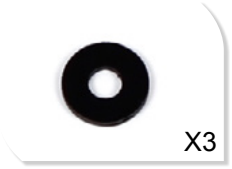
X3

## 3

Fit a second landing gear / body plate on top...

## 4

...add nylon washers and finish with a M3 nyloc nut. Do not fasten the screws yet.


X3

X3

## 5

Now slide the engine mount plate onto the landing gear/body assembly with the chamfered holes facing downward.

## 6

Add screws, washers and nyloc nut to hold the engine mount plate in place. There are no spacers needed. Leave all your screws fastened loosely.

X1

X1

X1

## 7

Repeat step 1 - 7 to assemble the remaining 3 Landing Gear / Body plate sections.

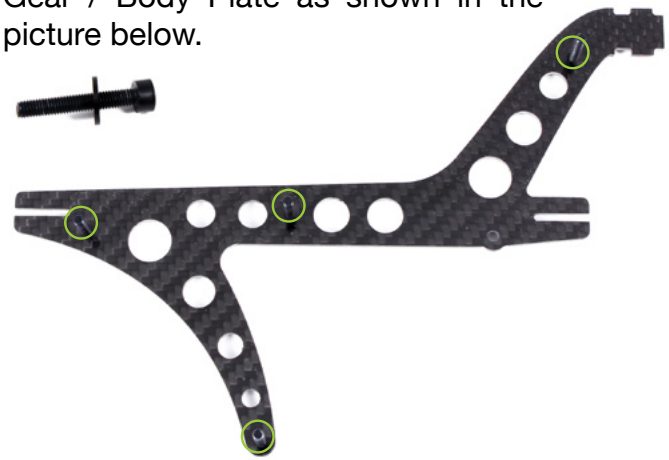
# PART 1: LG / BODY PLATE ASSEMBLY MINI 6 – PARTS LIST

| Product Code | | Parts + Spares | | |
|---|---|---|---|---|
| **1101-0020** | Top Hub | 2 | | |
| **1201-0020** | Center Plate | 1 | | |
| **1201-0030** | Universal Flight Controller Adapter Plate | 1 | | |
| **1201-0040** | Engine Mount Plate | 6 | | |
| **1401-0010** | Landing Gear / Body Plate | 12 | | |
| **1406-0050** | Velcro Strap | 1 | | |
| **2503-0070** | Standoff Threaded M3x11mm Nylon | 4 | | |
| **2506-0030** | Socket Head Cap Screw M3x20mm | 32 | (1) | |

| Product Code | | Parts + Spares | | |
|---|---|---|---|---|
| **2506-0140** | Machine Screw M3x6mm Pan Philips | 9 | (1) | |
| **2506-0170** | Nyloc Nut M3 SS | 33 | (2) | |
| **2506-0190** | Nylon Washer M3 | 62 | (2) | |
| **2506-0210** | Nylon Spacer M3x10mm | 19 | (1) | |

## 1

Slide a Washer over the M3x20 Socket Head Cap screw and slide into the corresponding holes of the Landing Gear / Body Plate as shown in the picture below.

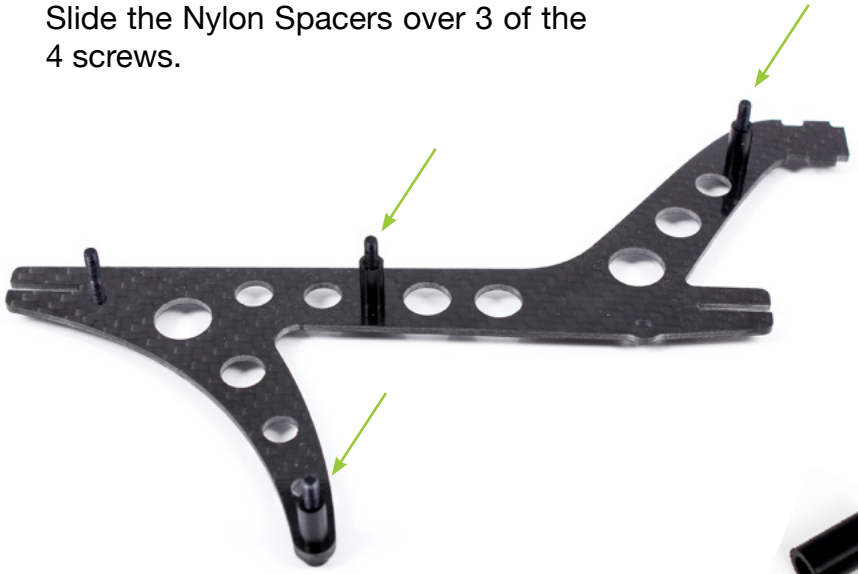


X4

X4

## 2

Slide the Nylon Spacers over 3 of the 4 screws.



X3

## 3

Fit a second Landing Gear / Body Plate on top...

## 4

...add Nylon Washers...

X4

## 5

...and finish with a M3 Nyloc Nut. Before fastening the screws...

X4

## 6

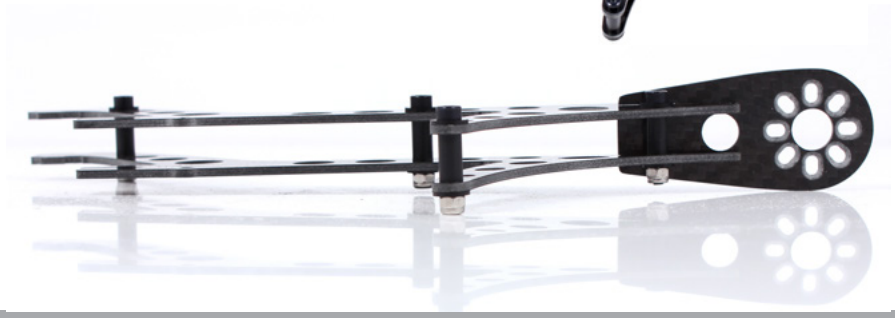
...slide the Engine MountPlate onto the Landing Gear/Body Assembly with the chamfered holes facing downwards.

## 7

Now tighten all screws.

## 8

Repeat step 1 - 7 to assemble the remaining 5 Landing Gear / Body Plate sections.

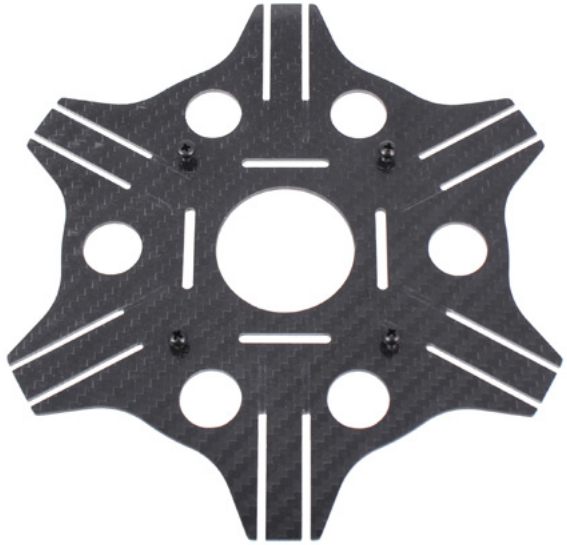


# PART 2: AIRFRAME ASSEMBLY

Attaching your Landing Gear / Body Plate to the Mini 4 Airframe follows the same principles as the Mini 6 does. Althought some parts (Center Plate, Hub, ...) look slightly different, the set-up is exactly the same. For that reason this chapter only shows the construction instructions for the Mini 6.

## 1

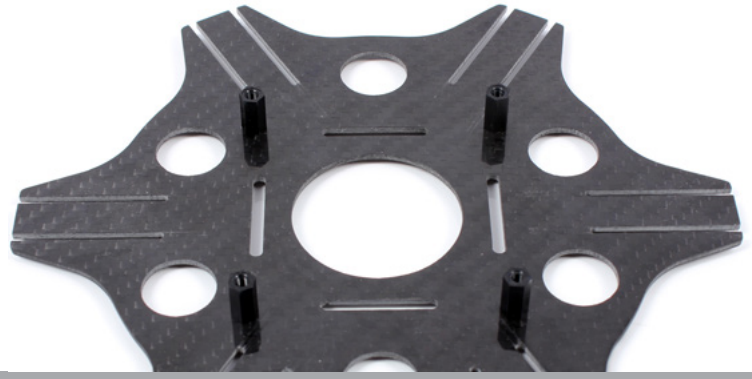
Fit the M3x6mm Machine Screws into the holes of the Mini 6 Center Plate .



X4

## 2

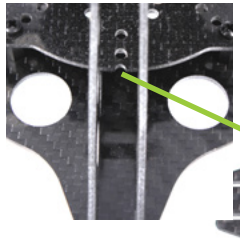
Turn the Center Plate over - now facing up. Use the Standoffs to tighten the screws.



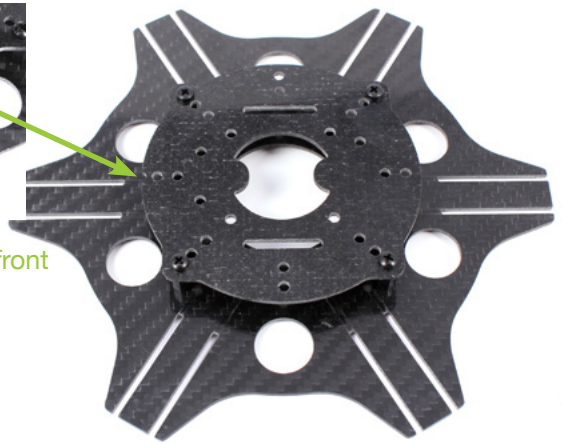
X4

## 3

Place the Universal Flight Controller Adapter Plate on top and fix with another four M3x6mm Machine Screws.



Notch indicates front of craft!



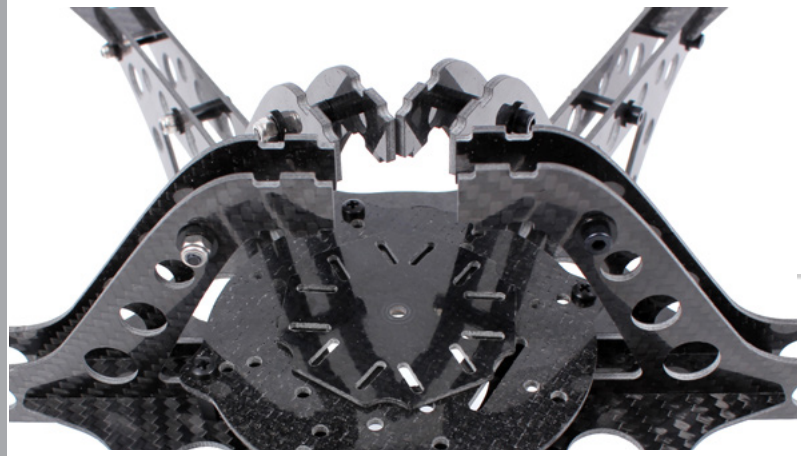
X4

## 4

Slide 4 of the 6 Landing Gear / Body setups into the corresponding slots of the Center Plate.

## 5

Put one of the Top Hubs onto the Flight Controller Adapter Plate before sliding the remaining 2 Landing Gear / Body Assemblies into the slots of the Center Plate.

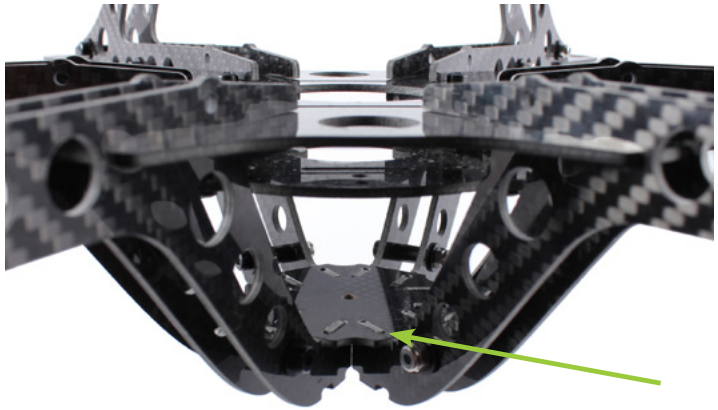


## 6

Your setup should now look like this...

## 7

Turn your set-up upside down, slot the inner Top Hub onto the Landing Gear Assemblies as shown in the picture below.



## 8

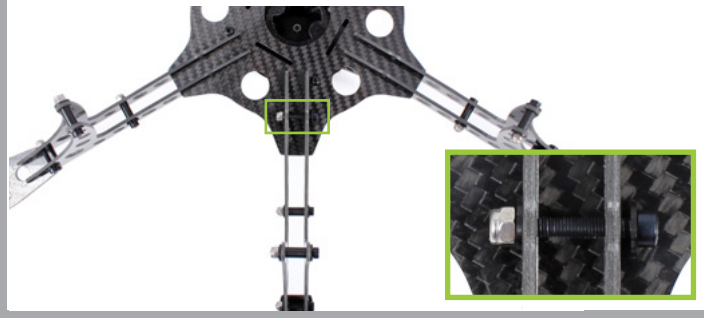
Turn your set-up back, place the second Top Hub on the top section of the Langing Gear Assemblies...

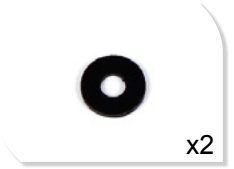
## 9

...and tighten with a Socket Head Cap Screw M3x20mm and a M3 Nyloc Nut.

## 10

The last step is to fasten the Landing Gear / Body Plate Assembly to the Center Plate, using a M3x20 Socket Head Cap Screw, Washers and a M3 Nyloc Nut. (see step 1-5)





## 11

Repeat step 10 until all connections of the Mini Landing Gear Assembly are securely fastened.

## 12

Your set-up should now look like this.

# PART 2: ENGINE MOUNTING – PARTS LIST

| Product Code | | Parts |
|---|---|---|
| | Your Mini Airframe | 1 |
| **2506-0120** | Engine Mount Screws M3x6mm | 4 |
| | Engine | 1 |

## 1

Take a moment to familiarise yourself with the engine mount disk on your Mini6 Airframe. There are multiple engine mount options available for a wide range of different engines for your craft.

## 1

Make sure you have your cables running towards the center of the craft...

## 2

...use the screws delivered with the engine to mount onto the craft.

X4

## 3

Tighten all screws.

# 5

Your mounted engine should now look like this...